Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 1999 Proceedings

Americas Conference on Information Systems (AMCIS)

December 1999

Information Systems Leadership in the Network Economy: The Impact of Internet Technology on the Role of Corporate Chief Information Officer

Nolan Taylor
University of Georgia

Information Systems Leadership in the Network Economy: The Impact of Internet Technology on the Role of Corporate Chief Information Officer

Nolan J. Taylor (ntaylor@uga.edu), Terry College of Business, Department of Management, University of Georgia, Athens, GA 30602

Research Problem

The growing strategic importance of information technology (IT) has transformed the role of IT management. In particular, the information systems leader's role has experienced rapid transformation, emerging as an executive position accountable for not only the management of information resources, but information systems strategy as well (Arnett and Jones, 1994). One of the most significant technologies confronting these managers is the Internet. Internet technology, including Internet sites, single company private Internets (intranets), and multiple company private Internets (extranets) are rapidly gaining acceptance within firms. Like its client/server predecessor, Internet technology has the potential to radically change organizational roles (O'Hara and Watson, 1995).

Popular press reviews have noted several CIO concerns related to Internet technology. These issues range from end user issues such as user dissatisfaction, application proliferation, and productivity losses due to the new technology, to technical issues such as data security, executing transactions online, and legacy system integration (Connolly, 1998). The objective of this research is to more closely examine the impacts of Internet technology on the information executive's work. A better understanding of Internet technology's impact on the CIO role is an important step toward quantifying IS leadership demands in "network era" as well as improving executive education programs for CIOs and other managers. The principal research questions addressed are:

*RQ1) What aspects of Internet technology and organizations explain **wh**y the CIO role changes have occurred?*

*RQ2) What specific changes in the CIO's work define **how** the CIO as been impacted by Internet technology?*

Theoretical Bases for IT-based change

IT-based change has resulted in the creation, elimination, and restructuring of work at all levels of the organization (Barley, 1986). Three perspectives have gained prominence as explanations for technology-driven organizational change. These perspectives view organization change as a function of 1) *the characteristics of the technology* (technological imperative), *the actions of human actors* (organizational imperative), or *a complex interactions between technology and human actors* (emergent perspective) (Markus and Robey, 1988; Pfeffer, 1982). These "lenses" provide insight into the mechanisms of change in the CIO role.

Technological Imperative Perspective

According to this school of thought, technology is an independent causal force on organizational structure. The relationship between technology and the organization are conceived as being orderly and more or less independent of human actors (Barley, 1986). Managerial actions are seen as being "the result of external constraints, demands, or forces that the social actor may have little control over or even cognizance of" (Pfeffer, 1982, 8). This body of research points to the impact of technology characteristics on organizational structure and roles. Several characteristics of Internet technology including reduced application development time and open systems standards have been suggested to be different enough from other technology formats to merit special consideration.

P1: Changes in the CIO role are related to characteristics of Internet technology.

A firm's familiarity with a technology also affects the management approaches that are most appropriate (McKenney and McFarlan, 1982). Diffusion theory suggests that the intent of management actions relative to technology necessarily vary according to the maturity of a particular technology within the organization (Raho, et al., 1987).

P2: Changes in the CIO role are related to the maturity level of Internet technology within the organization.

Organizational Imperative Perspective

This perspective notes the importance of management decisions on eventual organizational impacts of technology. In this perspective, technology is seen as a vehicle through which managers affect change. Choices occur prior to the action itself, and that action is goal directed (Pfeffer, 1982, 6). Specific strategies as well as the means of achieving strategic objectives are the key determinants of change. These changes have typically

been assessed through configuration, centralization, differentiation, and formalization variables (Miller, et al., 1991; Pinsonneault and Kraemer, 1993).

P3: Changes in the CIO role are related to characteristics of the organization's strategy.

Emergent Perspective

A third perspective attempts to capture the dynamic and subjective nature of technology in the organization. Organizational change can also be viewed as a complex interaction of technical and human systems. In this perspective, perceptions and expectations related to technology shape the technology leader's role (Tsui, 1990). Thus, an organization may be conceived as a system of roles (Katz and Kahn, 1978), with each manger bringing a set of expectations and priorities to the position regarding desirable managerial behaviors for his or her role. Superiors, subordinates, and peers also influence the manager's role, having interests in and perceptions of different aspects of the focal manager's role. A central assumption is that a manager strives to maximize his or her reputational effectiveness, that is, judgements made by each constituent regarding the extent to which his or her expectations are being met by the focal manager's behavior (Tsui, 1990).

P4: Changes in the CIO role are related to characteristics of the CIO's relationships.

Assessing IT-Based Change in the CIO Role

The introduction of information technology can be viewed as a change in the organization's information processing requirements. The uncertainty caused by new technology results in greater information processing demands on the part of the decision-maker (Galbraith, 1973). For the IS executive, these changes result in corresponding shifts in tasks, responsibilities, and structure. For example, tasks may be regrouped around product rather than function (e.g., self-managed teams), additional or entirely new roles may be created (e.g., liaison roles), or new organizational structures (e.g., matrix organizations) created to reduce information processing demands or increase information processing capacity (Galbraith, 1973).

While conceptually separate, in practice, these levels of change are often intertwined and difficult to separate (Barley, 1990). This is particularly true when the technology implementation constitutes an ongoing process rather than an isolated event (Orlikowski and Hofman, 1997) as is the case with open technologies such as the Internet. Multiple level analysis provides a useful way of studying technology-driven change (Markus and Robey, 1988). Focusing on the intersections between level of analysis can provide new and critical insights into the relationship between technology and social systems (Sproull and Goodman, 1990).

The Socio-Technical Systems (STS) perspective provides a means of understanding the interaction between technology and organizational roles using mixed levels of analysis. The STS model conceives the organization as two jointly interacting systems -- the social and technical (Bostrom and Heinen, 1977). The technical system includes the specific processes or *tasks* and the *technology* used to produce outputs. The social system consists of people and structure. The *people* of the organization each possess unique skills, values, and attitudes by virtue of their position in the organization. *Structure* defines the specific roles and relationships resulting from communication, authority, and workflow systems within the organization The Socio-Technical Change Impact (SCI) model (Figure 1) extends the conventional STS model to include levels of change (O'Hara, et al., 1998).

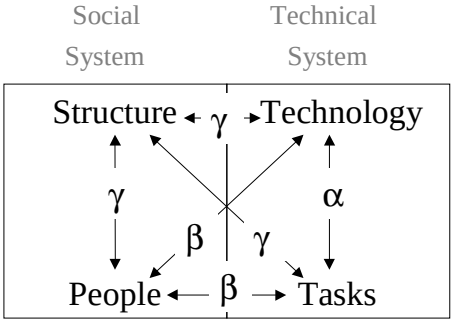

Figure 1 The Socio-Technical Change Impact (SCI) Model (O'Hara, et al., 1998)

The first order (alpha) change is evident by alterations in the way tasks are performed. For example, the introduction of the calculator may shift tasks normally performed manually to automated processes. These changes involve little impact on the work system since it improves but does not change processes (O'Hara and Watson, 1995). In second order (beta) change, people (roles and skills) as well as tasks are impacted. Increased information processing requirements may necessitate broader skill sets while increased information processing demands may result in new or expanded organizational roles. For example, the flexibility of the word processor required somewhat different skills than did the typewriter (O'Hara and Watson, 1995). Finally, in third order (gamma) change, not only are tasks and roles altered, but entire departments or organizations are restructured as well. In changes of this nature, the basic approach to organizing work is reshaped (O'Hara and Watson, 1995), for example, reengineering.

Research Methods

This research employs qualitative techniques to study the change of the CIO role caused by Internet-based systems. Multiple sources are planned as a way to improve the reliability of the data. These sources include CIO and HR manager interviews, "internal" (e.g., organization charts) and "external" (Web sites, SEC filings, and popular press articles) documents.

Case study methods (Benbasat, Goldstein and Mead, 1987) using semi-structured interviews will be employed to explore the CIOs' experiences and perceptions of Internet technology. Interviews will be tape recorded for further analysis. Document reviews will be used as a method of triangulation. Data analysis is planned to follow theory development procedures prescribed by (Eisenhardt, 1989).

References

Arnett, K.P. and Jones, M.C. "Firms That Choose Outsourcing - a Profile," *Information & Management* (26:4), 1994, pp. 179-188.

Barley, S.R. "Technology as and occasion for structuring: Evidence from observations of CT scanners and the social order of radiology departments," *Administrative Science Quarterly* (31:1), 1986, pp. 78-108.

Barley, S.R. "The alignment of technology and structure through roles and networks," *Administrative Science Quarterly* (35:1), 1990, pp. 61-103.

Bostrom, R.P. and Heinen, J.S. "MIS problems and failures: a socio-technical perspective: part I: the application of socio-technical theory," *MIS Quarterly* (1:4), 1977, pp. 11-28.

Connolly, J.M. "Does anyone really have a plan?," *Computerworld*, (32:14), April 6 1998, pp. 75.

Eisenhardt, K.M. "Building theories from case study research," *Academy of Management Review* (14:4), 1989, pp. 532-550.

Galbraith, J.R. *Organizational design: an information processing view*, Addison-Wesley, Reading, MA, 1973.

Katz, D. and Kahn, R.L. *The social psychology of organizations*, Wiley, New York, NY, 1978.

Markus, M.L. and Robey, D. "Information technology and organizational change: casual structure in theory and research," *Management Science* (34:5), 1988, pp. 583-589.

McKenney, J.L. and McFarlan, F.W. "The information archipelago -- maps and bridges," *Harvard Business Review* (60:5), 1982, pp. 109-119.

Miller, C.C., Glick, W.H. and Huber, G., P. "Understanding technology-structure relationships: Theory development and meta-analytic theory testing," *Academy of Management Journal* (34:2), 1991, pp. 370-399.

O'Hara, M.T., Kavan, C.B. and Watson, R.T. *The alpha, beta, and gamma of change: Facilitating positive outcomes*, Working paper, University of Georgia, Athens, GA, 1998.

O'Hara, M.T. and Watson, R.T. "Automating, informating, and transforming the organization: The role of business process reengineering and client/server technology," In *Business process change: reengineering concepts and methods*, V. Grover and W. Kettinger (Ed.), Idea Group, Harrisburg, PA, 1995, pp. 143-164.

Orlikowski, W.J. and Hofman, J.D. "An improvisational model for change management: The case of groupware technologies," *Sloan Management Review* (38:2), 1997, pp. 11-21.

Pfeffer, J. *Organizations and organization theory*, Pitman, Boston, 1982.

Pinsonneault, A. and Kraemer, K.L. "The impact of information technology on middle managers," *MIS Quarterly* (17:3), 1993, pp. 271-292.

Raho, L.E., Belohlav, J.A. and Fiedler, K.D. "Assimilating new technology into the organization: an assessment of McFarlan and McKenney's model," *MIS Quarterly* (11:1), 1987, pp. 47-58.

Sproull, L.S. and Goodman, P.S. "Technology and organizations: Integration and opportunities," In *Technology and organizations*, P. S. Goodman, L. S. Sproull and Associations (Ed.), Jossey-Bass Publishers, San Francisco, 1990, pp. 254-265.

Tsui, A.S. "A multiple-constituency model of effectiveness: An empirical examination at the human resource subunit level," *Administrative Science Quarterly* (35:3), 1990, pp. 458-483.